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FIG. 23. *PAGODA TREE.*
Sophora japonica L.

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THE ASSOCIATES, through whose interest and generosity The *Bulletin* and certain other undertakings of the Arboretum are made possible, is an informal group of individuals interested in encouraging and furthering the educational and research endeavors of the Morris Arboretum. Further information concerning this organization will be sent on request.

Pagoda Tree

A source of continuous admiration at the Morris Arboretum is the large rounded mass of a Japanese Pagoda Tree which stands near the main gate on Meadowbrook Avenue. Two other reasonably good specimens exist in the arboretum but while one of these has considerably larger and more imposing flower clusters, neither has yet attained such fine proportions as the one pictured on the cover. This particular tree is at present 57 feet high, with a spread of 70 feet and trunk diameter of 36 inches.

The Pagoda Tree, *Sophora japonica,* is interesting in several respects. In the first place it suffers from a misnomer. It is usually referred to as the *Japanese* Pagoda Tree. While it is true that this tree is frequently met as a planted specimen in Japan it seems indigenous, nevertheless, only to China where it occurs over a very large area. The alternative name of Chinese Scholar Tree might be more suitable were it not for the fact that the "pagoda" angle now seems rather firmly entrenched in our western literature. Because it flowers late and these flowers seem to offer the last welcome stamping ground for Japanese beetles it is sometimes, here in Chestnut Hill, referred to as the Japanese Beetle Tree,—but that is neither here nor there. The blossoms at this time of the year, in August and early September, are fortunately so plentiful that the few remaining beetles have a difficult task indeed to make more than a very poor showing in their depredations. It is bothered by little else in the way of insects or diseases.

Sophora japonica, along with Black Locust, Yellowood and Kentucky Coffee Tree, is one of the relatively few tree members of *Leguminosae,* the pea family. It has the typical pinnate or divided leaves and pea-like flowers (see Figure 24). In the United States the flowers are usually pale yellowish in color. This is evidently the commonest form although it has been noted that forms with pure white flowers are to be found in Central China, and others, bright yellow in color, in the vicinity of Canton. Like certain other members of the pea family the leaflets of the Pagoda Tree have a tendency to partially fold together at night, and it is interesting that an observation of such leaf movement was recorded in Erh-ya, a Chinese dictionary, in the 12th Century B.C. The Pagoda Tree must have been one of the first subjects for a botanical observation of this nature! Throughout Chinese history it has played a part in the ceremonies of official audiences while its flowers have been used to produce a yellow dye and its pods for medicine. Cultivation in Europe

(*continued on page 52*)

Men and Nut Trees

AN OPEN LETTER TO THE MANAGERS OF ARBORETA

By Dr. J. Russell Smith

Professor Emeritus of Economic Geography, Columbia University

The anthropologists are continually revising and raising their estimates as to the duration of the period during which man has been using tools. Five hundred thousand years is now a fairly common estimate. For nearly all of this time man lived in what we commonly call the Stone Age. For the last few years, say 2% of the time, men (some of them) have been farmers. During the major part of the half million years, say 98%, or something like 490,000 years, our ancestors depended upon wild products for their food. If it was digestible they ate it—beast, bird, insect, fish, fowl, egg, grub, root, branch, nut husk, leaf, flower—just so it was digestible.

During this long period nut trees played a very important role in the support of men in the temperate latitudes. Hickory nut, walnut, beechnut, filbert, hazelnut and pine nut were standard articles of food, but especially the acorn.

The American Indian is reported to have pounded up hickory nuts, shells and all, and boiled the whole mass. The high percentage of fat floated on the top as a creamy layer to be skimmed off and used as butter with the corn meal and acorn products. The walnut with its high protein was both meat and rival to the marrow, which was a great delicacy with the primitive man. It was his closest approach to ice cream. Anthropologists have recently discovered and identified in eastern Germany an earthenware vessel filled with beechnut butter at least 2,000 years old.

The acorn seems to have been the King of nuts for a few hundred thousand years of the Stone Age and the oak has probably outranked all the other nut trees combined in its services to primitive man. There are many species; they have wide distribution, and acorns have excellent keeping qualities. Their high food value is shown by the table on page 48.

Perhaps you say that acorns are bitter. True, most of them are. They are bitter with tannin, soluble in water. This fact was discovered ages ago. The primitive woman cracked up the acorn meats, leached them in water and, behold, the bitter things became sweet.*

* See page 152 "Tree Crops," J. Russell Smith, Walnut Lane Press, Swarthmore, Penna. for an account of making acorn bread by the experimenters of the Missouri Botanical Garden.

John Muir, the famous California naturalist, did much mountain climbing, often living in the open for days. As described in The National Geographic Magazine, August, 1918, he carried a small pack and lived on acorn bread made by the local Indian recipe. He claimed, furthermore, that nothing the white man had was equal to it.

Wheat has been an agricultural product for the last 10,000 years, but during this time it has been a staple food of only two of the four major groups of humans. It is entirely possible that in the hundreds of thousands of years of the pre-agricultural period man ate more of acorns than he has ever eaten of wheat. Perhaps the old adage that history repeats itself will be repeated with the nut trees. They may return as great staples in human sustenance and there are several reasons to suggest this possibility.

1. *The new scientific basis of crop selection.* All our important crops—wheat, corn, barley, rye, oats, rice, sweet potato, white potato,—are annuals which were domesticated by the primitive man (probably woman) in the undated past. Surely we are now in a position to do better than these primeval, unlettered opportunists! Scientific botany is beginning to test plants, not for their *annual* possibilities but for their *total* possibilities. In this connection the tree shows itself as the great natural engine of production. Certain wild oak trees have been known to yield a ton of acorns at a crop. Walnut trees yield many bushels. These are but samples.

2. *The new horticultural process.* In the recent past the horticultural process has consisted largely of finding one good wild tree, a chanceling, and propagating it by grafting or budding. Thus we have millions of navel orange trees grown from one chance freak of nature. By this process came nearly all the apple trees in our orchards, nearly all peach trees, plum trees and cherry trees.

We now have *plant breeding.* As a scientific practice plant breeding is a very new thing, dependent as it is upon the so-called Mendelian law, first put to work in this century. By applying modern methods of plant breeding we may change agriculture as high-speed steel has changed the machine shop and given us cheaper auto-

mobiles and other machinery. New vistas in agricultural production open before us as we consider the use of plant breeding applied to the very effective wild trees to produce much better trees. We have here the possibility of a whole new series of crops that grow on trees rather than on straw and corn stalks. Such a new principle may increase the yields per acre, but there is a much more important aspect. If we think of ourselves as part of the human race, it offers the possibility of agriculture without soil destruction, that is,—*permanent agriculture.*

The United States has one of the finest blocks of farm land in the world. Our corn belt is without a rival but how long will it last? I recommend the reading of a bulletin from the Soil Conservation Service, Washington, D. C. giving the latest estimate of soil destruction by erosion in the United States. Consider its facts, and the probable future of our country makes one shiver. In the short period since some of the readers of this article were born we have destroyed more land, twice over, than the Japanese people were using in 1943 to support themselves as a world menace. Japan is cropping about 15 million acres, we have destroyed about 50 million,—a large part of it within 50 years,—and we partly destroyed several times as much more.

We are so destructive because we are unintelligent transplanters of European agriculture. We brought with us European agriculture which is the agriculture of wheat, barley, rye, oats and clover—plants which cover the ground. We added to them in America corn,, cotton and tobacco, plants which have row culture and cultivation between the plants. We came from North Europe where rains are gentle to America where we have the torrential thunderstorm. The fields of corn, cotton and tobacco, repeatedly cultivated during the summer, are repeatedly ripped by the rushing gully waters of the thunderstorm. Hence this appalling destruction and hence the new possible importance of nut-bearing trees as savers of America.

We are now using millions of dollars worth of English walnuts, Brazil nuts, filberts, hazel nuts, cashews, cocoanuts. We should look forward to the early date when acorn bread would be as easily obtained as a loaf of wheat bread, and like the wheat bread made in a factory. This means that we need to have first a search of the whole Temperate Zone for the most productive specimens of oak trees, selective breeding within the species, hybridization between the species, and testing of tens of thousands of these scientifically bred plants each year.

At the present time we Americans are still cutting down natural forest on the Appalachian

*AVERAGE COMPOSITION OF NUTS AND OTHER FOODS

Kind of Food	Refuse	Edible Portion							Fuel value per lb.
		Water	Protein	Fat	Carbohydrates: Sugar Starch, etc.		Crude Fiber	Ash	
Nuts and Nut Products:	%	%	%	%	%	combined %	%	%	calories
Acorn, fresh	17.80	34.7	4.4	4.7	50.4		4.2	1.6	1,265
Filbert	52.08	5.4	16.5	64.0		11.7		2.4	3,100
Hickory Nut	62.20	3.7	15.4	67.4		11.4		2.1	3,345
Pecan	50.10	3.4	12.1	70.7	8.5		3.7	1.6	3,300
Walnut (Persian)	58.80	3.4	18.2	60.7	13.7		2.3	1.7	3,075
Walnut (American Black)	74.1	2.5	27.6	56.3		11.7		1.9	3,105
Meat, Round Steak		65.5	19.8	13.6				1.1	950
Wheat Flour, high grade		12.0	11.4	1.0	74.8		.3	.5	1,650
White Bread		35.3	9.2	1.3	52.6		.5	1.1	1,215
Beans, dried		12.6	22.5	1.8	55.2		4.4	3.5	1,605
Potatoes	20.00	78.3	2.2	.1	18.0		.4	1.0	385
**Corn meal		12.5	9.2	1.9		74.4	1.0	1.0	
**Wheat flour		11.5	11.4	1.0		75.4	.2	.5	
**Leached acorn		11.3	4.5	19.8		62.0	2.1	2.9	

* Unless otherwise stated, from "Nuts and their uses as food" by M. E. Jaffa, Professor of Nutrition, University of California, U. S. Dept. Agr. Farmers' Bulletin, No. 332, reproduced in "Tree Crops" (p. 304) by J. Russell Smith, Walnut Lane Press, Swarthmore,, Pa.

** Figures from C. Hart Merriam, National Geographical Magazine, Aug. 1918.
In studying the column marked "refuse" it should be remembered that some of the nuts tested were the poor, wild produce of the present markets rather than from such selected and improved strains as can be grown.

mountainsides and then proceeding to ruin these mountainsides with 3 to 10 crops of corn. There is no reason why such hillsides, with the proper kind of oak trees, should not yield each year for centuries more carbohydrate food than they do now in each of the few crops of corn that come between clearing and ruin by gully. If this sounds a little pipe-dreamy, it is only because we haven't applied scientific imagination to the materials now in hand. There are such mountainsides in Corsica, Italy, France, the Balkans and Spain that have been yielding similar crops of chestnuts for many centuries with no appreciable soil loss. There was no soil loss because there was no tillage, and there was enough undergrowth and leaf and twig waste to maintain fertility and prevent erosion. It may be mentioned that the Chinese chestnut now holds out the easy possibility of chestnut orchards on American hillsides like those that have existed in Europe for the last few centuries.

This article is written as an appeal to the managers of arboreta to select and breed oak trees as indicated above. Many arboreta have done valuable work in gathering together collections of specimens of trees, keeping the trees alive and putting labels on them, but that is not enough.

Some one will say—let the government do it, but past experience has shown that government workers are unfortunately both dependent upon and handicapped by frequent changes of administration, intermittent appropriations, and the mercies of budget makers who too frequently lack any understanding of basic agricultural concepts. A few attempts have been made but the output of government-sponsored research in a field of such fundamental economic importance as tree breeding has been pathetically small. If any one is inclined to doubt that I suggest a check-up on what the United States Government and those of the 48 states have done to select and breed the following very productive wild trees of the United States: Black Walnut, Butternut, Pecan, Shagbark, Shellbark, Pine Nut, Hazel Nut, Beech, Persimmon, Pawpaw, Haw, Wild Plum, Wild Cherry.

An arboretum in private hands can have continuity and I hope that some such arboretum may give a world service and create a world reputation by applying Mendel's Law to the genus *Quercus* with scientific imagination.

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Forest Genetics Research at the Arboretum

Under various Acts of Congress, the Forest Service of the United States Department of Agriculture set up Forest Experiment Stations in the principal forest regions of the United States. One of these, the Allegheny Forest Experiment Station, charged with conducting research in the problems presented by the forests and woodlands of Pennsylvania, New Jersey, Delaware and Maryland, was established in 1926 with headquarters in Philadelphia, in cooperation with the University of Pennsylvania. From the beginning and until recently the offices of this Station were located on the campus of the University. When in 1941 the Regional Forester's office (in charge of state and private cooperative activities and of the national forests of the Northeastern United States) was moved from Washington, D. C., to Philadelphia, the office of the Allegheny Station was joined with that of the Regional Forester in downtown Philadelphia. The close relation with the university continues, especially with its Department of Botany where until fairly recently the Allegheny Station, in cooperation with the Bureau of Plant Industry of the U. S. Department of Agriculture, maintained a laboratory for the investigation of tree diseases.

Curtailment by Congress of funds for forest research with the approach of war led the U. S. Forest Service in 1941 to close the Northeastern Forest Experiment Station at New Haven, Conn., transferring the administration of certain selected research activities of that section to the Allegheny Station in Philadelphia.

Among these was the Forest Genetics Project concerned with the production, through hybridization and selection, of improved races and strains of forest trees for general forest or more specialized purposes. Since the immediate availability of a wide variety of native and exotic tree species of flowering and fruiting age is important for the successful prosecution of this work, especially that concerned with hybridization, the Allegheny Station surveyed its territory including Washington, D. C., for possible headquarters for the forest genetics work. The choice fell upon the Morris Arboretum which was happy to extend its facilities to the Allegheny Forest Experiment Station.

Dr. Ernst J. Schreiner is in charge of the work. The Arboretum has provided office and laboratory space in the administration building. On the fertile Hagerstown loam soil of the Arboretum's Bloomfield Farm land has been made available on which Dr. Schreiner and his staff have established nurseries for current experimental work and for maintaining stocks. For certain aspects of the work space and facilities are available in Arboretum greenhouses.

Since this work commenced, the Allegheny Station in Philadelphia has been renamed the Northeastern Forest Experiment Station. In September of last year Dr. Schreiner was also given charge of the Beltsville Work Center of the Northeastern Station at Laurel, Maryland. The Morris Arboretum project, however, remains under his supervision although it is now carried forward under the immediate direction of Dr. Jonathan W. Wright who was appointed to the staff of the Northeastern Forest Experiment Station in July of this year. Dr. Wright was formerly in the Department of Forestry at Purdue University.

Through this association the rich Arboretum collections of living woody plants serve additional ends through their utilization in the little explored but assuredly important field of developing new improved races of trees and shrubs for forest and other more specialized uses in the broad field of conservation.

J.R.S.

Notes From the Library

The library now contains approximately 2200 volumes dealing with many angles of the complicated subject of Botany. There are works on flora of different parts of the world, agricultural information, books on ecology, mycology and genetics, as well as bound journals of botanic gardens and horticultural magazines, volumes on landscape architecture, historic gardens and specialized subjects in the various fields. This library contains also some valuable old volumes from the Bartram collection and although not complete in any one field, taken together with the Department library it forms a fairly adequate reference source for diversified plant information.

Library hours at the Arboretum are from 9 to 12 and 1 to 5 Mondays through Fridays. The library is in charge of the Arboretum Secretary who works in cooperation with Miss Mary Newkirk, Librarian for the Department of Botany.

Among books acquired since 1942 are the following titles:

AN AGRICULTURAL TESTAMENT—Sir Albert Howard, Agricultural Adviser (Oxford Press, 1940)

CAMOUFLAGE WITH PLANTING—Ralph Rodney Rood (Chicago, R. F. Seymour, 1942)

CEANOTHUS—Maunsell van Rensselaer (Santa Barbara) Botanical Garden, 1942)

CHEMISTRY OF INSECTICIDES AND FUNGICIDES—D. E. H. Frear (Van Nostrand Co., 1942)

CONSERVATION OF NATURAL RESOURCES, Morris Arboretum Monograph No. 2—Univ. of Penna. Bicentennial Conference (University Press, 1941)

DWARF AND SLOW GROWING CONIFERS. 2nd Ed. Murray Hornibrook (C. Scribner's Sons, 1938)

FOREST FLORA OF JAPAN—Charles Sprague Sargent (Houghton, Mifflin & Co., 1894)

FOREST TREE SEED—H. I. Baldwin (Chronica Botanica, 1942))

THE FRIENDLY EVERGREENS, L. L. Kumlien (D. Hill Nursery Co., Dundee, Ill. 1946)

GARDENING, A COMPLETE GUIDE TO GARDEN MAKING—Montague Free (Harcourt Brace Co., 1937)

GARDENING WITH THE EXPERTS—By noted authorities (Macmillan Co., 1942)

GUIDE TO THE MUSHROOMS OF NEW YORK—Louis C. C. Krieger, Mycologist N. Y. State Museum (Univ. of N. Y. Press, 1935)

HERBS, THEIR CULTURE AND USES—Rosetta E. Clarkson (Macmillan Co., 1942)

IF I WERE TO MAKE A GARDEN—E. H. Wilson (Stratford Co. Boston, Mass. 1931)

ILLUSTRATED FLORA OF THE PACIFIC STATES—Leroy Abrams (Stanford Univ. Press, Calif. 1944)

MAINTENANCE OF SHADE AND ORNAMENTAL TREES—P. P. Pirone (Oxford Press, N. Y. 1941)

MANUAL OF MUNICIPAL AND COUNTY PARKS—Edited by L. H. Weir (Barnes, N. Y.)

MODERN FRUIT PRODUCTION—J. H. Gourley and F. S. Howlett (Macmillan Co., 1942)

MORE ARISTOCRATS OF THE GARDEN—E. H. Wilson (Stratford Co., 1930)

ORNAMENTAL AMERICAN SHRUBS—W. R. Van Dersal (Oxford Univ. Press, 1942)

PLANTS IN THE HOME—Frank K. Balthis (Macmillan Co., 1942)

POISONOUS PLANTS—Walter C. Muenscher (Macmillan Co., 1939)

PRUNING TREES AND SHRUBS—Ephraim Porter Felt (Orange Judd Co., Inc. 1941)

PLOWMAN'S FOLLY—Edward H. Faulkner (Univ. of Okla. Press, 1943)

ROCKY MOUNTAIN TREES—Richard J. Preston, Jr. (Iowa State College Press, 1940)

SHRUBS AND TREES FOR THE SMALL PLACE—P. J. Van Melle (C. Scribner's Sons, 1943)

SWARTHMORE PLANT NOTES—A record of all the plants grown by the Arthur Hoyt Scott Horticultural Foundation, Swarthmore College, Swarthmore. John C. Wister, Director, 269 mimeographed pages.

A TEXTBOOK OF GENERAL BOTANY – Smith, Gilbert, Egans, Duggar, Bryan. Allen of the Univ. of Wis. (Macmillan Co., 1942)

THE FOOD GARDEN–Lawrence and Edna Blair (Macmillan Co., 1942)

THE SPECIES OF RHODODENDRON– (Rhododendron Society of England. 1930)

TIMBERS OF THE NEW WORLD–S. J. Record and R. W. Hess (Yale Univ. Press, 1942)

TREES AND SHRUBS OF BRITAIN – J. C. Loudon (Longmans, Green and Co., 1869)

TREES AND SHRUBS FOR PACIFIC NORTHWEST GARDENS–John and Carol Grant (Dogwood Press, Seattle, 1943)

WEEDS OF LAWN AND GARDEN–A Handbook for Eastern Temperate North America. By John M. Fogg, Jr. University of Pennsylvania Press.

The Library has been enriched this summer by a variety of gifts. From Mr. Albert F. Meehan of Dresher, Penna. come four volumes of THE HORTICULTURAL ART JOURNAL of 1886 through 1889, published by the Stecher Lithographic Company of Rochester, New York. Within the calf-trimmed marbeled boards the "Publisher's Card" reads: "The pages of this Monthly Journal will be devoted to disseminating a correct and faithful representation by means of colored lithograph plates made from nature by skilful artists of the new and meritorious productions of the Nursery, Seed Garden and Green House." Most of the plates are richly colored and the text contains scientific notes and data of interest to historians of horticulture in America. A Directory Supplement lists the chief nurseries of the period in 7 states from New York to Wisconsin. These volumes from the Library of Mr. Meehan's grandfather, Thomas Meehan of Germantown, will serve as a valuable reference source for the origins of numerous early horticultural varieties. Such information is often very hard to find.

Another friend and associate of the Arboretum, Mrs. E. Florens Rivinus, brought us three most interesting contributions. First a piece of inlay made by Indians in Mexico, about 18 x 14 inches square inside a carved frame. It represents an Indian girl on horseback in the desert, and every scrap of the picture, down to the coil of the lariat on the saddle horn, is made of native Mexican woods cut and fitted with skilful craftsmanship. The colors are harmonious and the whole effect unusually vivid for this type of work. It now adorns the library wall above the secretary's desk.

The two weighty volumes of the Monograph on the *Genus Rosa* by Ellen Wilmott, with drawings by Alfred Parsons R.A. (London, 1914) comprise the second gift from the Rivinus library. This, the best known reference source on roses, is a valuable work whose beautifully colored plates will bring Oh's and Ah's from rose-loving visitors during the long months when the rose gardens are bare of bloom.

An especially prized addition is an ancient, enormous and excellently preserved volume of RIVINI INTRODUCTIO GENERALIS IN REM HERBARIAM, (1690 edition), an heirloom in the Rivinus family. Concerning the work and its author Dr. John M. Fogg makes the following comments:

"Augustus Quirinus Bachmann (1652-1725) was for many years Professor of Botany, Physiology, Materia Medica and Chemistry at the University of Leipsic. Following the practice of many scholars of his day, Bachman latinized his name and wrote under the non de plume of Rivinus. His magnum opus, published in 1690 under the title "Introductio generalis in rem herbariam" gives the author's theories on plant relationships and elucidates the principles to be followed with respect to the naming of genera and species. Rivinus advocated the practice of allotting a generic and a specific name to each kind of plant and in a sense anticipated the principle of binomial nomenclature later crystalized by Bauhin and Tournefort. He was one of the first botanists to reject the traditional classification of plants into trees, shrubs and herbs,—a classification which had been popularized by Aristotle and slavishly followed by students for nearly 2,000 years. Linnaeus later acknowledged the pioneering efforts of the author of the "Introductio."

"A great English contemporary, John Ray, writing of this work a few years after its appearance says: 'I emphatically recommend Rivinus' work for its careful notes on floral differences, for its ingenious analysis of them as a basis for classification, for its beauty and clarity, its purity of Latin, its elegant plates. But the learned author will forgive me if, as is the way of mankind, I am too partial to my own system and think it more congruous to the nature of plant-life than his.' Although Rivinus was more interested in nomenclature than in structure as a basis of plant relationships, his position in the history of botany is secure and his *Introductio* is an important milestone. The copper plates,—which number approximately 500,—are believed to have cost the author in the neighborhood of 80,000 florins."

A quaint flavor of the time emerges from the Latin preface: "If Botanic study has ever flourished truly it thrives as much as possible in these times, when not only medical men but all who have at heart the most joyous science of nature put so much industry in the examination of plants that commonly he who may be caught wholly inexperienced in this matter does not know how to bear himself in the company of amateurs, to say nothing of learned men."

M.C.

Weeds of Lawn and Garden

A Handbook for Eastern Temperate North America

by JOHN M. FOGG, JR.

Friends of the Morris Arboretum will be especially interested in the above contribution by Dr. Fogg, recently published by the University of Pennsylvania Press with the aid of the Arboretum. In a compact space of some 215 pages, Dr. Fogg gives the kind of information which should prove extremely useful to everyone who owns a garden and for whom the problem of weeds has not yet been entirely solved.

The notable feature of this book is the clearly reproduced illustration in the upper half of each page representing the species under consideration. No keys are found in this work but 189 species can be readily identified by comparison with the figures. In most cases the entire plant is shown in flower and fruit together with its root system. Where the species is unrecognizably different in its juvenile stage (when it is easiest to eradicate) this stage is shown. The latter is helpful to novice and experienced gardener alike, especially during the early growing season when the wrong plant may be destroyed or allowed to grow because of uncertainty. Each illustration is identified by common and scientific names, habitat of the species and its life span. In addition to the common run of weeds, several pages at the end of the book show what eight of the more common tree "weedlings" look like when they invade lawns and gardens.

The remainder of each page is devoted to information about the flowers and seed, habit, distribution and other characteristics helpful in establishing the weed's identity. Extermination methods are suggested under each species in addition to the chapter entitled "Chemical Control," both of which should be useful to the practical gardener.

In the introduction the author discusses fully the subjects: What is a weed? Why some plants are weeds; Dispersal of weeds; Geographical origin of weeds, and Weeds as soil indicators. There is a glossary of terms used in describing the weeds themselves, a bibliography for those interested in the further study of these plants and a complete index.

FIG. 21. Flower clusters of *Sophora japonica*.

The handy pocket size and waterproof binding enable one to use this manual in garden or field without risk of spoiling the cover from dew or ground moisture, and although non-technical in character the accuracy of the drawings and descriptive material make this work useful to layman and professional alike.

J.W.A.

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Pagoda Tree

(*continued from page* 46)

dates from 1747 when it was sent to France by the Jesuit missionary Pere d'Incarville.

Sophora japonica is characterized by very smooth dark green twigs which have naked and densely hairy violet brownish buds. Its leaves have a fresh and rather distinctive bright green color and are carried very late into October. The flower clusters mature to pods which are usually constricted between each seed giving the curious effect of numerous pendant beadstrings. In the eastern United States the Pagoda Tree forms a quite beautiful and relatively broad and rounded mass supported by one or several main trunks. It is longlived and ages well. Its all year appearance combined with late season flowering and general pest resistance make it a fit subject for far wider usage in home ground and park planting than it has so far been accorded.

H.T.S.